

# **Rancho La Costa Habitat Conservation Area**

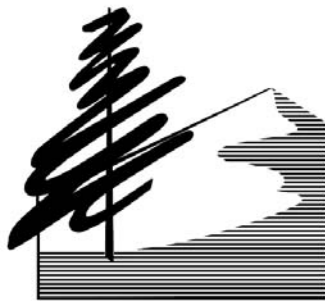
A Dedicated Natural Open Space System Set Aside as part  
of the La Costa Villages, University Commons and  
Cassia Professional Offices Developments  
and also includes the “Nelson” parcel.

(S016, S020, S022, S026 and S037)

## **Annual Work Plan** October 2007 - September 2008

### ***Prepared for:***

U.S. Fish and Wildlife Service  
California Department of Fish and Game  
City of Carlsbad  
City of San Marcos



### ***Prepared by:***

Markus Spiegelberg and Jessie Vinje  
The Center for Natural Lands Management  
215 West Ash Street  
Fallbrook, CA 92028

November, 2007

## Table of Contents

<b>I.</b>	<b>Introduction and Summary .....</b>	<b>1</b>
<b>II</b>	<b>Management Activities .....</b>	<b>2</b>
	A. Capital Improvements .....	2
	B. Biological Surveys .....	3
	C. Habitat Maintenance and Restoration .....	3
	D. Public Service .....	4
	E. Reporting .....	5
	F. Office Maintenance .....	6
	G. Operations .....	6
<b>III.</b>	<b>Workload and Budgets .....</b>	<b>6</b>
	A. Supervision and Staffing .....	6
	B. Budgets.....	6
<b>IV.</b>	<b>References .....</b>	<b>6</b>
<b>V.</b>	<b>Appendices .....</b>	<b>7</b>
	Appendix 1. 2007-2008 Task Schedule .....	8
	Appendix 2. Fiscal Year Budgets .....	9
	Appendix 3. HCA Location Maps. ....	20
	Appendix 4. Thread-leaved Brodiaea Research Proposal.....	23
	Appendix 5. CSS Monitoring Plan .....	28

## **I. INTRODUCTION AND SUMMARY**

This annual work plan has been developed from the guidelines for goals and objectives set forth in the Habitat Management Plan for the Rancho La Costa Habitat Conservation Area (Plan) dated May 2005 (CNLM 2005). The Plan includes management requirements agreed to by the United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG), and additional management activities that the Center for Natural Lands Management (hereafter the "Center" or CNLM) feels is appropriate to protect and maintain the natural resources in perpetuity. The Center holds fee title and conservation easements to the Rancho La Costa Habitat Conservation Area (HCA) and performs or oversees the tasks identified in the plan.

The HCA was created by combining several areas, which were dedicated to the Center for long term management from the La Costa Villages, University Commons and Cassia Professional Offices (Cassia) developments. The Cassia property, which is about 1 acre, was added in January of 2007 and lies adjacent to the 'Greens' property of La Costa Villages.

Each development dedicated several parcels that have been identified in the past by various names or associations. The La Costa Villages project dedicated parcels referred to as Oaks, Ridges, Greens, Choumas-Pappas, and Alemir, of which the former three are located in Carlsbad, and the latter two are located in the County of San Diego. The University Commons project dedicated parcels referred to as the "on-site parcels", Frank's Peak, Pfau (Conservation Easement), Huff, Wilern, Winston and Setter and Elfin Forest (Conservation Easement). The Elfin Forest parcels are located both on-site (San Marcos) and within the County of San Diego. The Setter parcel is within the County of San Diego. All the other University Commons parcels are located within the City of San Marcos. The Nelson parcel was purchased by the National Fish and Wildlife Foundation and deeded to the Center. This parcel is located in the County of San Diego.

As of October 2007, the Center owns or holds conservation easements on all the properties set aside by these developments, except for one parcel that is owed to us by the La Costa Villages Development. The entire HCA is also completely funded.

The purpose of this work plan is to identify the tasks and budget required to complete the management activities for this management year, which will begin on October 1, 2007 and end on September 30, 2008. Unless otherwise stated, all tasks will be performed by the Center's Area Manager, Markus Spiegelberg, and Preserve Managers, Jessica Vinje and Patrick McConnell.

### **Summary of Tasks and Goals for the 2007-2008 Fiscal Year:**

- Replace signs, post fencing in several locations and fix fencing as necessary
- Repair about 250 meters of trail and install container plants to revegetate an eroded trail
- Note all animal species observed and map locations of any sensitive species

- Conduct vegetation sampling at permanent plots within the thread-leaved brodiaea (*Brodiaea filifolia*) populations
- Set up permanent vegetation monitoring transects within the coastal sage scrub areas
- Map and survey for sensitive plant species as listed in the Habitat Management Plan.
- Remove nonnative plant species, especially perennial pepperweed (*Lepidium latifolium*), onion weed (*Asphodelus fistulosus*), Ward's weed (*Carrichtera annua*), pampas grass (*Cortaderia* spp.), and tamarisk (*Tamarix* spp.).
- Continue the onion weed herbicide experiments with the University of California at Davis, Agriculture Extension
- Maintain and monitor the Huff/Hidden Canyon restoration site
- Coordinate with Homeowner's Associations (HOAs) on HCA issues, coordinate public outreach events and prepare public outreach literature
- Coordinate with trail volunteers and Eagle Scouts to accomplish HCA projects
- Mow and clear fuel breaks
- Patrol and conduct site enforcement on a regular basis
- Report and describe data collected and management actions taken on the HCA to the wildlife agencies
- Provide an accounting of funds to be spent in the fiscal year

Appendix 1 (*2007-2008 Field Schedule*) identifies the approximate schedule of field work throughout the management year. Appendix 2 (*Annual Budget 2007-2008*) provides a financial summary for both staff time and costs for the year. The location of the HCA is mapped in Appendix 3.

## II. MANAGEMENT ACTIVITIES

The following sections identify and describe the activities to be performed during this management year. Based upon the Property Analysis Record (PAR) developed by the Center to outline long-term management tasks and costs, management activities for the HCA can be categorized into several groups: Capital Improvements, Biological Surveys, Habitat Restoration and Maintenance, Public Services, Reporting, Office Maintenance, and Operations. Each of these categories will be discussed below.

**NOTE: All categories marked with an asterisk are required per the Management Plan.**

### A. CAPITAL IMPROVEMENTS

Fencing and signing are the only capital improvements to be undertaken during the 2007-2008 management year.

**1. Fencing** The Center will construct about 500 linear feet of barbed wire fencing in several locations throughout the HCA. We will be fencing within the southern most parcel of the oaks, near the eastern edge of the questhaven parcels, within portions of the Brouwer areas, and on Denk Mountain.

**2. Signing** CNLM signs have been posted at all of the major access points to the HCA and a few other notable locations for the parcels owned as of the summer of 2007. The Box Canyon Area, and land to the north of it, is posted “No Trespassing” and the remaining land is posted as permitted, but restricted access. Additional signs will be installed on the Brouwer and Wilern parcels and in other strategic locations throughout the HCA. Each sign explains that the HCA is a dedicated open space, and that OHV activity, dumping and shooting is prohibited.

## **B. BIOLOGICAL SURVEYS**

The following section outlines monitoring activities planned for the next fiscal year. All data will be entered or stored in Geographic Information System (GIS) and/or MSAccess/excel databases. A brief description of monitoring activities outlined by taxa is provided below:

**1. Vegetation Sampling** One of the Center’s goals is to track vegetation variables within the grassy areas (Greens) that are known to support thread-leaved brodiaea.

**Objective:** Increase, or protect a stable mean density, of thread-leaved brodiaea and decrease the percent cover of nonnative grasses, specifically purple-false brome (*Brachypodium distachyon*).

See Appendix 4 (Research Proposal for the Herbicide Application of Fusilade to Thread-leaved Brodiaea [*Brodiaea filifolia*]) for the vegetation sampling proposal.

**1a. Long-term Coastal Sage Scrub Monitoring** As per the Plan, CNLM has a goal of setting up long-term coastal sage scrub monitoring areas to track change in the coastal sage scrub community. In 2005, we set up vegetation transects stratified by fire history, distance from edge and vegetation sub-association. We used that data to direct our current action and plan (Appendix 5). We will setting up our vegetation transect and plots per this CSS monitoring plan in the winter of 2007-2008, with the goal of conducting the actual monitoring in the spring of 2009.

## **2. Sensitive Plant Species**

The HCA hosts over 10 sensitive plant species. The location and abundance of each of these species was mapped and counted in 2003. These surveys will be repeated every three to five years depending on the species (see Plan). During this fiscal year, we will map and conduct focused surveys for thread-leaved brodiaea, San Diego thornmint (*Acanthomintha ilicifolia*), summer holly (*Comarstaphylis diversifolia*), Del Mar manzanita (*Artostaphylos glandulosa* var. *crassifolia*), sticky-dudleya (*Dudleya viscida*), wart-stemmed ceanothus (*Ceanothus verrucosus*), California adolphia (*Adolphia californica*), and scrub oak (*Quercus dumosa*). We will use a hand-held Global Positioning System device for most species.

## **C. HABITAT RESTORATION AND MAINTENANCE**

Habitat restoration and enhancement will continue during the next fiscal year. The following nonnative removal projects will occur in the next fiscal year:

- We will drill and fill, or cut and stump spray, eucalyptus (*Eucalyptus* spp.) trees in various locations throughout the HCA
- We will treat fennel (*Foeniculum vulgare*), artichoke thistle (*Cynara cardunculus*), perennial pepper weed, onion weed, Ward's weed, pampas grass, tamarisk, ice plant (*Carpobrotus* spp.), tree tobacco (*Nicotiana glauca*), and palms (*Phoenix canariensis*) at the Greens.
- We will treat weeds growing in the Huff restoration area and in the Huff parcel
- We will treat about ½ acre of pampas grass at the Brouwer parcel
- We will treat various nonnatives, including a large patch of iceplant at the small oak woodland located in the southwestern portion of the HCA.
- We will treat fountain grass (*Pennisetum setaceum*), castor bean (*Ricinus communis*), and acacia (*Acacia* spp.) resprouts along the old Rancho Santa Fe Road.

During the 2006 fiscal year the Center began restoring the former mulch facility area at the Huff parcel. We hydro-seeded the area with a native coastal sage scrub mix and planted about 100 coast live oak trees in the fall and winter of 2005. We also installed an irrigation system on one-half of the area. During this fiscal year, we will be planting container plants and hydro-seeding, several portions of this area that are not taking well, as well as remove nonnative plant species from these areas.

Additionally, in coordination with University of California at Davis, Agriculture Extension, we established herbicide experiments during the 2005-2006 and the 2006-2007 fiscal years. These experiments were established to determine the effectiveness of herbicides on the invasive and nonnative plant, onion weed. We will continue these experiments in coordination with the University of California at Davis, Agriculture Extension during this next fiscal year.

| We will be mowing and clearing several fuel management areas adjacent to homes that border the HCA. We will be using hired contract crews to accomplish this work.

#### **D. PUBLIC SERVICES**

Public services activities include the patrolling of the HCA and the response to emergencies. However, other opportunities for public service will undoubtedly be forthcoming during the year, such as a spring nature walk, local groups and individuals interested in volunteering labor for HCA projects, and class field trips from local schools. Whenever possible management will try to accommodate these activities.

1. **Patrols** Patrols will be performed approximately once to twice per week.
2. **Emergency Response** Staff time has been allocated from the current budget for management to respond to emergencies on the HCA. Such emergencies could include response to wildfires, wildlife problems reported by neighbors and illegal trespass.

3. **Nature Walks/Outreach/Trails.** During this fiscal year, the Center will be working on trails near the Setter and questhaven parcels to develop better connections within this area. We will also be posting more fencing and signs designed to guide users in the area. We will also be working with local HOAs on HCA issues and will be coordinating public outreach events and preparing public outreach literature. Lastly, we will be working with local Eagle Scouts to accomplish HCA projects.

## **E. REPORTING**

Activities included within reporting requirements include the management of the HCA's database/Geographic Information System (GIS) system, the photo-documentation stations, and the production of various status reports to the USFWS, CDFG and CNLM administration.

### **1. Database/GIS Management**

Data derived from routine patrols and photo-documentation will be entered into and maintained in the HCA's existing database/GIS system. Additional databases will be established for the various biotic monitoring programs including the production of historical and current vegetation maps. Efforts will be made to coordinate and standardize database fields and parameters with other reserves.

### **2. Photo-documentation Stations**

Photo-documentation stations were created in 2003 and 2004. Photo's will be taken at these stations every three years and were last taken in 2006. We will take photo's of various activities during the fiscal year, including nonnative removal tasks, public outreach events and/or any vandalism that we observe.

### **3. Reports**

- a. **Year-End/Agency Reports** By December 15, 2008, a year-end report will be prepared by the Preserve manager detailing the results of the year's management activities. This report will include recommendations for the continuation of various activities for the following fiscal year and will be submitted to the County of San Diego, City's of San Marcos and Carlsbad, the USFWS and the CDFG as required under permit reporting conditions.
- b. **Annual Work Plan** The work plan for the 2008-2009 fiscal year will be formulated by the end of the 2007-2008 fiscal year and will be based upon experiences during previous years' operations. This work plan will be submitted to the County of San Diego, City's of San Marcos and Carlsbad, USFWS and CDFG.
- c. **Management Plan** The Management Plan for this site was updated in June of 2005 and submitted to the County, City's of San Marcos and Carlsbad and the wildlife agencies. It will be revised in 2010.

## **F. OFFICE MAINTENANCE**

HCA Management will maintain offices in an organized manner to facilitate maximum efficiency. This section of the budget includes outlays for general office work, utilities, and telephones, among other items/tasks.

## **G. OPERATIONS**

Operations include the training and professional growth of Preserve Management personnel and inspection of the HCA by CNLM administration. Funds have been allocated in the current budget for both the Preserve Manager to attend classes or seminars during the fiscal year. Also included within this category of activity is the conduction of employee reviews.

## **III. WORKLOAD AND BUDGETS**

### **A. SUPERVISION & STAFFING**

The Area Manager, Markus Spiegelberg, will be supervised by the Center's Director of Conservation Science (DCS), Deborah Rogers. Tasks and hours will be coordinated by the Area Manager and approved by the DCS. Additionally, hours have been allocated for Dr. Rogers to assist with document reviewing and scientific research conducted on CNLM preserves. Mr. Spiegelberg will supervise the Preserve Managers, Jessica Vinje and Patrick McConnell.

### **B. BUDGETING**

A budget has been prepared for the 2007-2008 year and is included here as Appendix 2. Every effort will be made by the Center to allocate time and expenses according to this estimated budget. The budget for this fiscal year is based on the interest generated from four endowments and the initial and capital from one project (Cassia Professional Offices). The current budget for this fiscal year for Nelson, La Costa Villages, University Commons 1 (Brookfield), University Commons 2 (Scandia Development) and Cassia Professional Offices and are, respectively, \$3,850, \$76,028, \$33,556, \$6,454 and \$4,891, respectively.

## **IV. REFERENCES**

CNLM 2005. Habitat Management Plan for the Rancho La Costa Habitat Conservation Area. June 2005.

## **IV. APPENDICES**

# Appendix 1

## 2007-2008 Task Schedule

<b>Task</b>	<b>October- December 2007</b>	<b>January-March 2008</b>	<b>April to June 2008</b>	<b>July to September 2008</b>
<b>Nonnative plant removal</b>	X	X	X	X
<b>TLB Vegetation surveys</b>		X	X	
<b>Set up CSS vegetation plots</b>	X	X		
<b>Sensitive Plant Surveys</b>	X	X	X	X
<b>Restoration Activities</b>	X	X		
<b>GIS/database</b>	X			
<b>Trails/erosion</b>	X	X	X	
<b>Fencing/signage</b>	X	X	X	X
<b>Patrolling</b>	X	X	X	X
<b>Reports</b>	X			X
<b>Public outreach</b>	X	X	X	X

## **Appendix 2**

### **Annual Budgets 2007-2008**

# Section 9 - Ongoing Tasks and Costs

Property Title: Elfin Forest

Dataset: CA005

PAR ID: S026V08

10/16/2007

Budget: Annual Budget 2007-8

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
BIOTIC SURVEYS							
Plant Ecologist	CSS veg monit set up JV	L. Hours	4.00	32.48	129.92	1	129.92
Plant Ecologist	CSS veg monit set up PM	L. Hours	4.00	27.32	109.28	1	109.28
Science Director	Planning and Review	L. Hours	5.00	50.00	250.00	1	250.00
Sub-Total							489.20
HABITAT MAINTENANCE							
Exotic Plant Control	Kill Eucs & other exotics JV	L. Hours	8.00	32.48	259.84	1	259.84
Exotic Plant Control	Kill Eucs & other exotics PM	L. Hours	8.00	27.32	218.56	1	218.56
Sub-Total							478.40
PUBLIC SERVICES							
Patrolling	Patrol JV	L. Hours	16.00	32.48	519.68	1	519.68
Patrolling	Patrol PM	L. Hours	16.00	27.32	437.12	1	437.12
Sub-Total							956.80
GENERAL MAINTENANCE							
Project Management	Supervise/coordinate	L. Hours	2.00	32.48	64.96	1	64.96
Hauling, Truck	Truckload	Item	3.00	25.00	75.00	1	75.00
Other	Trash clean up	L. Hours	4.00	32.48	129.92	1	129.92
Other	Trash clean up	L. Hours	4.00	27.32	109.28	1	109.28
Sub-Total							379.16
REPORTING							
Database Management	Data Input	L. Hours	1.00	40.55	40.55	1	40.55
Annual Work Plan	Plan and PAR Budget	L. Hours	3.00	32.48	97.44	1	97.44
Agency Report	Annual Report	L. Hours	4.00	32.48	129.92	1	129.92
Monitoring Reports	CE compliance Monit	L. Hours	8.00	40.55	324.40	1	324.40
Sub-Total							592.31
OFFICE MAINTENANCE							
Administrative	Operations	L. Hours	14.00	32.48	454.72	1	454.72
Telephone Charges, Annual	Cell and office Phone	Year	0.01	3,300.00	33.00	1	33.00
Office Supplies, Year	Supplies	Year	0.01	2,500.00	25.00	1	25.00
Other	office reimbursement	Year	0.01	5,115.00	51.15	1	51.15
Sub-Total							563.87

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
FIELD EQUIPMENT							
Vehicle	Transportation Services	Mile	450.00	1.18	531.00	1	531.00
Sub-Total							531.00
OPERATIONS							
Audit	CPA Audit	Item	0.01	3,043.00	30.43	1	30.43
Insurance	General	Item	1.00	314.52	314.52	1	314.52
Other	Vacation, sick, retreat MS	L. Hours	3.00	40.55	121.65	1	121.65
Other	Vacation, sick ,retreat JV	L. Hours	3.00	32.48	97.44	1	97.44
Other	Vacation, sick ,retreat PM	L. Hours	2.00	27.32	54.64	1	54.64
Other	Retreat Expesne	Item	0.01	1,485.00	14.85	1	14.85
Other	Staff retreat	L. Hours	1.00	40.55	40.55	1	40.55
Other	Staff retreat	L. Hours	1.00	32.48	32.48	1	32.48
Other	Staff retreat	L. Hours	1.00	27.32	27.32	1	27.32
Other	Conf Expense	Item	0.01	500.00	5.00	1	5.00
Other	Bio One	Item	0.01	245.00	2.45	1	2.45
Sub-Total							741.33
CONTINGENCY & ADMINISTRATION							
Contingency							473.21
Administration							1,249.27
Sub-Total							1,722.48
Total							6,454.55

# Section 9 - Ongoing Tasks and Costs

Property Title: University Commons

Dataset: CA005

PAR ID: S022

10/16/2007

Budget: Annual Budget 2007-8

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
SITE CONSTRUCTION/MAINT.							
Fence - Installed	Labor JV	L. Hours	8.00	32.48	259.84	1	259.84
Fence - Installed	Labor PM	L. Hours	8.00	27.32	218.56	1	218.56
Fence	Barbed-wire, 2	roll	2.00	120.00	240.00	1	240.00
Fence	T-posts	Item	100.00	3.00	300.00	1	300.00
Sub-Total							1,018.40
BIOTIC SURVEYS							
Project Management	Supervise/coordinate MS	L. Hours	8.00	40.55	324.40	1	324.40
Plant Ecologist	Veg plot JV	L. Hours	16.00	32.48	519.68	1	519.68
Plant Ecologist	Adolph/Sens spec JV	L. Hours	24.00	32.48	779.52	1	779.52
Plant Ecologist	Veg plot PM	L. Hours	16.00	27.32	437.12	1	437.12
Plant Ecologist	O. brodia/sens spec PM	L. Hours	16.00	27.32	437.12	1	437.12
Science Director	Planning and Review	L. Hours	15.00	50.00	750.00	1	750.00
Sub-Total							3,247.84
HABITAT MAINTENANCE							
Exotic Plant Control	Survey, map remove JV	L. Hours	16.00	32.48	519.68	1	519.68
Exotic Plant Control	Survey, map remove PM	L. Hours	16.00	27.32	437.12	1	437.12
Sub-Total							956.80
PUBLIC SERVICES							
Patrolling	Patrol/ trails fence MS	L. Hours	25.00	40.55	1,013.75	1	1,013.75
Patrolling	Patrol/ fix fence JV	L. Hours	82.00	32.48	2,663.36	1	2,663.36
Patrolling	Patrol/ fix fences PM	L. Hours	32.00	27.32	874.24	1	874.24
Interpretive Literature	Copy	Page	300.00	0.30	90.00	1	90.00
Community Outreach	Meetings JV	L. Hours	8.00	32.48	259.84	1	259.84
Other	Eagle Scout projects	Item	1.00	350.00	350.00	1	350.00
Sub-Total							5,251.19
GENERAL MAINTENANCE							
Sanitation Control	Dump fees	Item	3.00	30.00	90.00	1	90.00
Sub-Total							90.00
REPORTING							
Database Management	Data Input JV	L. Hours	8.00	32.48	259.84	1	259.84
GIS/CAD Management	Data Management MS	L. Hours	8.00	40.55	324.40	1	324.40
GIS/CAD Management	Cadre GIS	L. Hours	4.00	65.00	260.00	1	260.00
Annual Work Plan	Plan and PAR Budget MS	L. Hours	4.00	40.55	162.20	1	162.20
Annual Work Plan	Plan and PAR Budget JV	L. Hours	4.00	32.48	129.92	1	129.92
Agency Report	Annual Report JV	L. Hours	16.00	32.48	519.68	1	519.68
Agency Report	Annual Report MS	L. Hours	8.00	40.55	324.40	1	324.40
Sub-Total							1,980.44

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
OFFICE MAINTENANCE							
Administrative	Operations MS	L. Hours	12.00	40.55	486.60	1	486.60
Administrative	Operations JV	L. Hours	20.00	32.48	649.60	1	649.60
Administrative	Operations PM	L. Hours	12.00	27.32	327.84	1	327.84
Office Supplies, Year	Supplies	Year	0.07	2,500.00	175.00	1	175.00
Telephone	Office and cell	Year	0.07	3,300.00	231.00	1	231.00
Other	Office Reimbursement	Year	0.07	5,115.00	358.05	1	358.05
Sub-Total							2,228.09
FIELD EQUIPMENT							
Vehicle	Transportation Services	Mile	3,200.00	1.18	3,776.00	1	3,776.00
Power Tools	Misc tools	Item	0.50	500.00	250.00	1	250.00
Uniforms	Specification Unif. Allowance	Item	0.07	300.00	21.00	1	21.00
Other	Data Logger	Item	1.00	200.00	200.00	1	200.00
Sub-Total							4,247.00
OPERATIONS							
Audit	CPA Audit	Year	1.00	213.00	213.00	1	213.00
Insurance	General	Year	1.00	431.49	431.49	1	431.49
Other	Conf expense	Year	0.07	500.00	35.00	1	35.00
Other	Vacation, sick holiday MS	L. Hours	15.00	40.55	608.25	1	608.25
Other	Retreat conf MS	L. Hours	3.00	40.55	121.65	1	121.65
Other	Vacation, sick holiday JV	L. Hours	14.00	32.48	454.72	1	454.72
Other	Retreat conf JV	L. Hours	4.00	32.48	129.92	1	129.92
Other	Vacation, sick holiday PM	L. Hours	12.00	27.32	327.84	1	327.84
Other	Retreat PM	L. Hours	4.00	27.32	109.28	1	109.28
Other	Retreat expense	Item	0.09	1,485.00	133.65	1	133.65
Other	Bio One	Item	1.00	17.00	17.00	1	17.00
Other	Taxes	Year	1.00	3,000.00	3,000.00	1	3,000.00
Sub-Total							5,581.80
CONTINGENCY & ADMINISTRATION							
Contingency							2,460.16
Administration							6,494.81
Sub-Total							8,954.97
Total							33,556.53

# Section 9 - Ongoing Tasks and Costs

Property Title: La Costa Rancheros-Morrow
Dataset: CA005
PAR ID: S020V08
10/16/2007

Budget: Annual Budget 2007-8

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
SITE CONSTRUCTION/MAINT.							
Fence - Installed	Labor JV	Lin. Ft.	16.00	32.48	519.68	1	519.68
Fence	Labor PM	Lin. Ft.	16.00	27.32	437.12	1	437.12
Fence - Installed	barbed wire	roll	3.00	80.00	240.00	1	240.00
Fence	t-posts	Item	150.00	3.00	450.00	1	450.00
Sub-Total							1,646.80
BIOTIC SURVEYS							
Project Management	Supervise/coordinate jv	L. Hours	8.00	32.48	259.84	1	259.84
Plant Ecologist	Greens veg plots ms	L. Hours	16.00	40.55	648.80	1	648.80
Plant Ecologist	Greens veg plots assistant	L. Hours	24.00	15.00	360.00	1	360.00
Plant Ecologist	Greens veg plots PM	L. Hours	40.00	27.32	1,092.80	1	1,092.80
Plant Ecologist	ACIL and B filifolia surveys	L. Hours	6.00	27.32	163.92	1	163.92
Plant Ecologist	Scrub oak, DM manz, sum.	L. Hours	24.00	32.48	779.52	1	779.52
Plant Ecologist	Scrub oak, DM manz, sum.	L. Hours	24.00	27.32	655.68	1	655.68
Plant Ecologist	Dudleya surveys	L. Hours	8.00	32.48	259.84	1	259.84
Plant Ecologist	Dudleya surveys	L. Hours	8.00	27.32	218.56	1	218.56
Plant Ecologist	Ceanothus/adolphia mapping	L. Hours	16.00	32.48	519.68	1	519.68
Plant Ecologist	CSS veg plot set up	L. Hours	24.00	32.48	779.52	1	779.52
Plant Ecologist	CSS veg plot set up	L. Hours	24.00	27.32	655.68	1	655.68
Science Director	Oversight	L. Hours	15.00	50.00	750.00	1	750.00
Sub-Total							7,143.84
HABITAT MAINTENANCE							
Plant Procurement	shrubs	plant band	100.00	2.00	200.00	1	200.00
Plant Maintenance	replace dri-water jv	L. Hours	24.00	32.48	779.52	1	779.52
Plant Maintenance	replace dri-water pm	L. Hours	16.00	27.32	437.12	1	437.12
Irrigation System, Temporary	Dri-water	Item	600.00	2.75	1,650.00	1	1,650.00
Exotic Plant Control	RECON	L. Hours	192.00	32.00	6,144.00	1	6,144.00
Exotic Plant Control	RECON skid sprayer rental	Item	6.00	250.00	1,500.00	1	1,500.00
Exotic Plant Control	Oversight, map & removal	L. Hours	16.00	32.48	519.68	1	519.68
Exotic Plant Control	Oversight, map & removal	L. Hours	24.00	27.32	655.68	1	655.68
Exotic Plant Control	Herbicide	Gal.	2.00	140.00	280.00	1	280.00
Brush Management	Fuel Modification RECON	L. Hours	80.00	32.00	2,560.00	1	2,560.00
Sub-Total							14,726.00
PUBLIC SERVICES							
Access Control	Patrol, fence, sign jv	L. Hours	130.00	32.48	4,222.40	1	4,222.40
Access Control	Public Outreach jv	L. Hours	20.00	32.48	649.60	1	649.60
Access Control	Patrol, fence, sign pm	L. Hours	104.00	27.32	2,841.28	1	2,841.28
Access Control	Patrol, fence, sign ms	L. Hours	40.00	40.55	1,622.00	1	1,622.00
Sign	Posts	Item	20.00	15.00	300.00	1	300.00
Other	misc ranger supplies	Item	1.00	200.00	200.00	1	200.00
Other	Eagle projects	Item	1.00	350.00	350.00	1	350.00
Sub-Total							10,185.28

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
<b>REPORTING</b>							
Database Management	Data Input	L. Hours	4.00	40.55	162.20	1	162.20
Database Management	Data Input	L. Hours	8.00	32.48	259.84	1	259.84
Annual Reports	General Reporting	L. Hours	16.00	32.48	519.68	1	519.68
Annual Reports	Agency Report MS	L. Hours	8.00	40.55	324.40	1	324.40
Annual Work Plan	Plan and PAR Budget	L. Hours	4.00	40.55	162.20	1	162.20
Annual Work Plan	Plan and PAR Budget	L. Hours	4.00	32.48	129.92	1	129.92
Sub-Total							1,558.24
<b>OFFICE MAINTENANCE</b>							
Administrative	Admin MS	L. Hours	32.00	40.55	1,297.60	1	1,297.60
Administrative	Admin JV	L. Hours	30.00	32.48	974.40	1	974.40
Administrative	Admin PM	L. Hours	20.00	27.32	546.40	1	546.40
Office Supplies, Year	Supplies	Year	0.16	2,000.00	320.00	1	320.00
Telephone	Email, Office and Cell phone	Year	0.16	3,300.00	528.00	1	528.00
Other	Office Reimbursement	Year	0.16	5,115.00	818.40	1	818.40
Sub-Total							4,484.80
<b>FIELD EQUIPMENT</b>							
Vehicle	Transportion Services	Mile	5,000.00	1.18	5,900.00	1	5,900.00
Sub-Total							5,900.00
<b>OPERATIONS</b>							
Audit	CPA Audit	Year	0.16	3,043.00	486.88	1	486.88
Insurance	General	Item	1.00	852.28	852.28	1	852.28
Other	Conf. expense	Item	0.16	500.00	80.00	1	80.00
Other	Retreat expense	Item	0.16	1,485.00	237.60	1	237.60
Other	Staff retreat MS	L. Hours	7.00	40.55	283.85	1	283.85
Other	Staff retreat JV	L. Hours	8.00	32.48	259.84	1	259.84
Other	Staff retreat PM	L. Hours	8.00	27.32	218.56	1	218.56
Other	Vacation,sick, holiday MS	L. Hours	34.00	40.55	1,378.70	1	1,378.70
Other	Vacation,sick, holiday JV	L. Hours	31.00	32.48	1,006.88	1	1,006.88
Other	Vacation, sick, holiday PM	L. Hours	26.00	27.32	710.32	1	710.32
Other	BioOne Subscription	Item	1.00	245.00	245.00	1	245.00
Other	Taxes	year	1.00	4,334.16	4,334.16	1	4,334.16
Sub-Total							10,094.07
<b>CONTINGENCY &amp; ADMINISTRATION</b>							
Contingency							5,573.90
Administration							14,715.10
Sub-Total							20,289.00
Total							76,028.03

# Section 9 - Ongoing Tasks and Costs

Property Title: Nelson Property

Dataset: CA005

PAR ID: S016V08

10/16/2007

Budget: Annual Budget 2007-8

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
BIOTIC SURVEYS							
Plant Ecologist	CSS veg. monitoring set up	L. Hours	12.00	32.48	389.76	1	389.76
Science Director	Planning and Review	L. Hours	3.00	50.00	150.00	1	150.00
Sub-Total							539.76
PUBLIC SERVICES							
Patrolling	Patrol	L. Hours	24.00	32.48	779.52	1	779.52
Sub-Total							779.52
REPORTING							
GIS/CAD Management	GIS MS	L. Hours	1.00	40.55	40.55	1	40.55
Annual Reports	report, wk plan, budget JV	L. Hours	8.00	32.48	259.84	1	259.84
Sub-Total							300.39
OFFICE MAINTENANCE							
Administrative	Operations	L. Hours	8.00	32.48	259.84	1	259.84
Telephone Charges, Annual	Phone Charges	Year	0.01	3,300.00	33.00	1	33.00
Office Supplies, Year	Supplies	Year	0.01	2,500.00	25.00	1	25.00
Other	Office reimbursement	Year	0.01	5,115.00	51.15	1	51.15
Sub-Total							368.99
FIELD EQUIPMENT							
Vehicle	Mileage	Mile	250.00	1.18	295.00	1	295.00
Sub-Total							295.00
OPERATIONS							
Audit	CPA Audit	Year	0.01	3,043.00	30.43	1	30.43
Insurance	General	Item	1.00	307.52	307.52	1	307.52
Other	Taxes	Year	1.00	5.45	5.45	1	5.45
Other	Vacation, sick holidays MS	L. Hours	2.00	40.55	81.10	1	81.10
Other	Vacation, sick holidays JV	L. Hours	2.00	32.48	64.96	1	64.96
Other	Vacation, sick, holidays PM	L. Hours	1.00	27.32	27.32	1	27.32
Other	Staff retreat	Item	0.01	1,485.00	14.85	1	14.85
Other	Conf Expense	Item	0.01	500.00	5.00	1	5.00
Other	BioOne Subscription	Item	0.01	245.00	2.45	1	2.45
Sub-Total							539.08

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Divide Years	Total Cost
CONTINGENCY & ADMINISTRATION							
Contingency							282.27
Administration							745.20
Sub-Total							1,027.47
Total							3,850.21

# Section 8 - Initial & Capital Tasks and Costs

Property Title: Cassia Professional Offices Open Space   Dataset: CA005   PAR ID: S036   10/16/2007

Budget: Annual Budget 2007-8

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Times Years	Total Cost
SITE CONSTRUCTION/MAINT.							
Lock	Padlock	Item	1.00	19.00	19.00	1.0	19.00
Sub-Total							19.00
BIOTIC SURVEYS							
Project Management	Supervise/coordinate	L. Hours	2.00	40.55	81.10	1.0	81.10
Plant Ecologist	Sens species	L. Hours	8.00	32.48	259.84	1.0	259.84
Science Director	Planning and Review	L. Hours	1.00	50.00	50.00	1.0	50.00
Sub-Total							390.94
HABITAT MAINTENANCE							
Exotic Plant Control	Hand Removal, Labor	L. Hours	4.00	32.48	129.92	1.0	129.92
Exotic Plant Control	Herbicide 41% con.	Gal.	0.05	135.00	6.75	1.0	6.75
Sub-Total							136.67
PUBLIC SERVICES							
Patrolling	Patrol JV	L. Hours	22.00	32.48	714.56	1.0	714.56
Sign, Aluminum	Signs and Posts	Item	4.00	22.00	88.00	1.0	88.00
Sub-Total							802.56
REPORTING							
Database Management	Data Input	L. Hours	2.00	40.55	81.10	1.0	81.10
GIS/CAD Management	Data Management	L. Hours	4.00	32.48	129.92	1.0	129.92
Annual Work Plan	Plan and PAR Budget	L. Hours	2.00	32.48	64.96	1.0	64.96
Agency Report	Annual Report	L. Hours	4.00	32.48	129.92	1.0	129.92
Sub-Total							405.90
OFFICE MAINTENANCE							
Administrative	Operations MS	L. Hours	4.00	40.55	162.20	1.0	162.20
Administrative	Operations JV	L. Hours	10.00	32.48	324.80	1.0	324.80
Preserve Office	Rent	Year	0.01	5,115.00	51.15	1.0	51.15
Taxes and Fees	Mosquito taxes	Year	1.00	5.14	5.14	1.0	5.14
Office Supplies, Year	Misc. supplies	Person	0.01	2,500.00	25.00	1.0	25.00
Telephone	Office phone, email and cell p	Year	0.01	3,300.00	33.00	1.0	33.00
Sub-Total							601.29

Task list	Specificaton	Unit	Number of Units	Cost / Unit	Annual Cost	Times Years	Total Cost
FIELD EQUIPMENT							
Vehicle	Transportation Services	Item	250.00	1.18	295.00	1.0	295.00
Uniforms	Specification Unif. Allowance	Item	1.00	20.00	20.00	1.0	20.00
Other	Misc tools and supplies	Item	1.00	250.00	250.00	1.0	250.00
Sub-Total							565.00
OPERATIONS							
Audit	CPA Audit	Item	0.01	3,043.00	30.43	1.0	30.43
Insurance	General	Fee	1.00	310.00	310.00	1.0	310.00
Employee Training	Retreat and Conf expense	Item	0.01	1,985.00	19.85	1.0	19.85
Conferences	Retreat and Conferences	L. Hours	1.00	40.55	40.55	1.0	40.55
Conferences	Retreat and Conferences	L. Hours	1.00	32.48	32.48	1.0	32.48
Conferences	Retreat and Conferences	L. Hours	1.00	27.32	27.32	1.0	27.32
Other	Vac and Holiday	L. Hours	2.00	40.55	81.10	1.0	81.10
Other	Vac and Holiday	L. Hours	2.00	32.48	64.96	1.0	64.96
Other	Vac and Holiday	L. Hours	2.00	27.32	54.64	1.0	54.64
Other	BioOne	Item	0.01	245.00	2.45	1.0	2.45
Sub-Total							663.78
CONTINGENCY & ADMINISTRATION							
Contingency							358.51
Administration							946.48
Sub-Total							1,304.99
Total							4,890.13

## **Appendix 3**

### **HCA Location Maps**

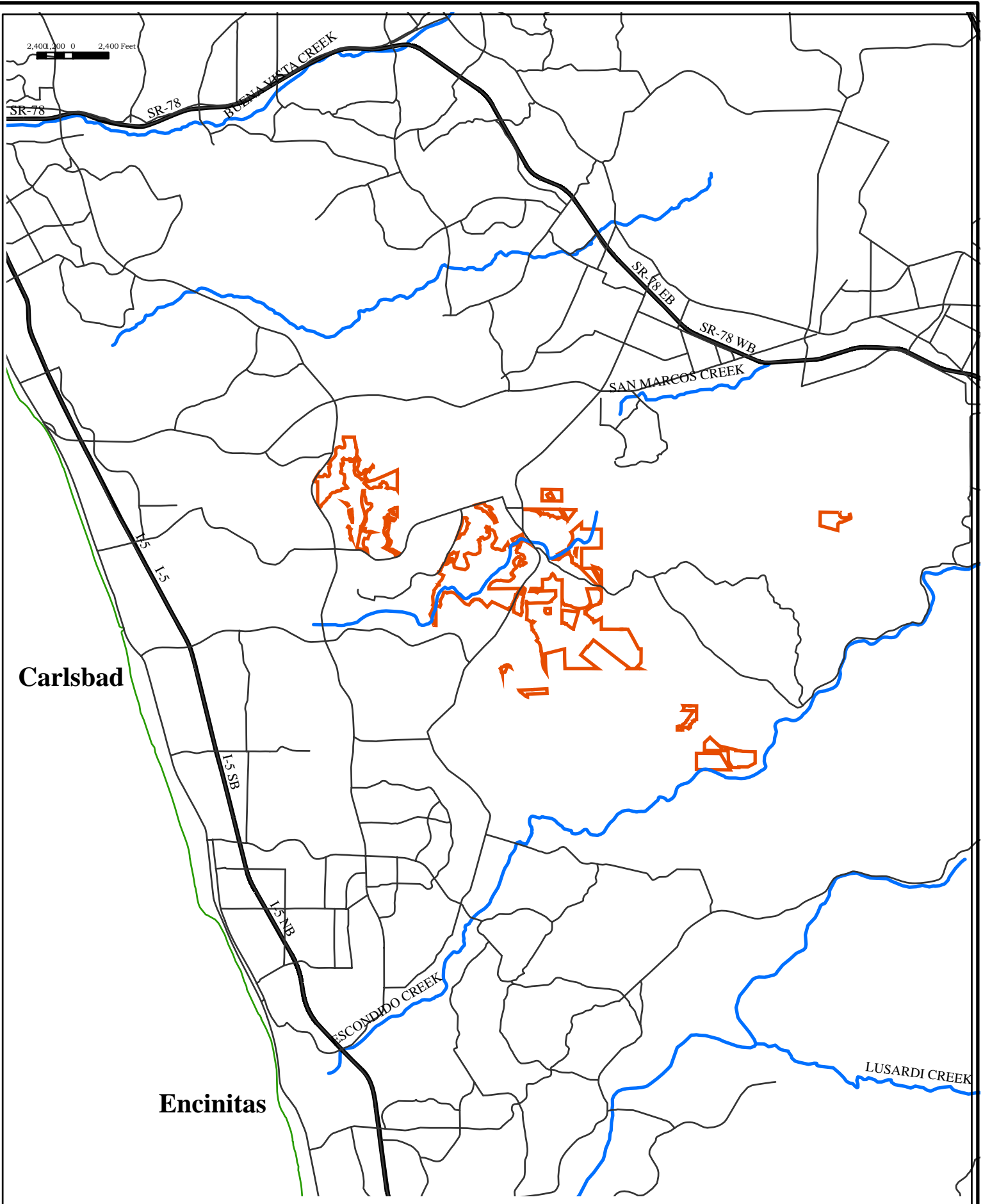
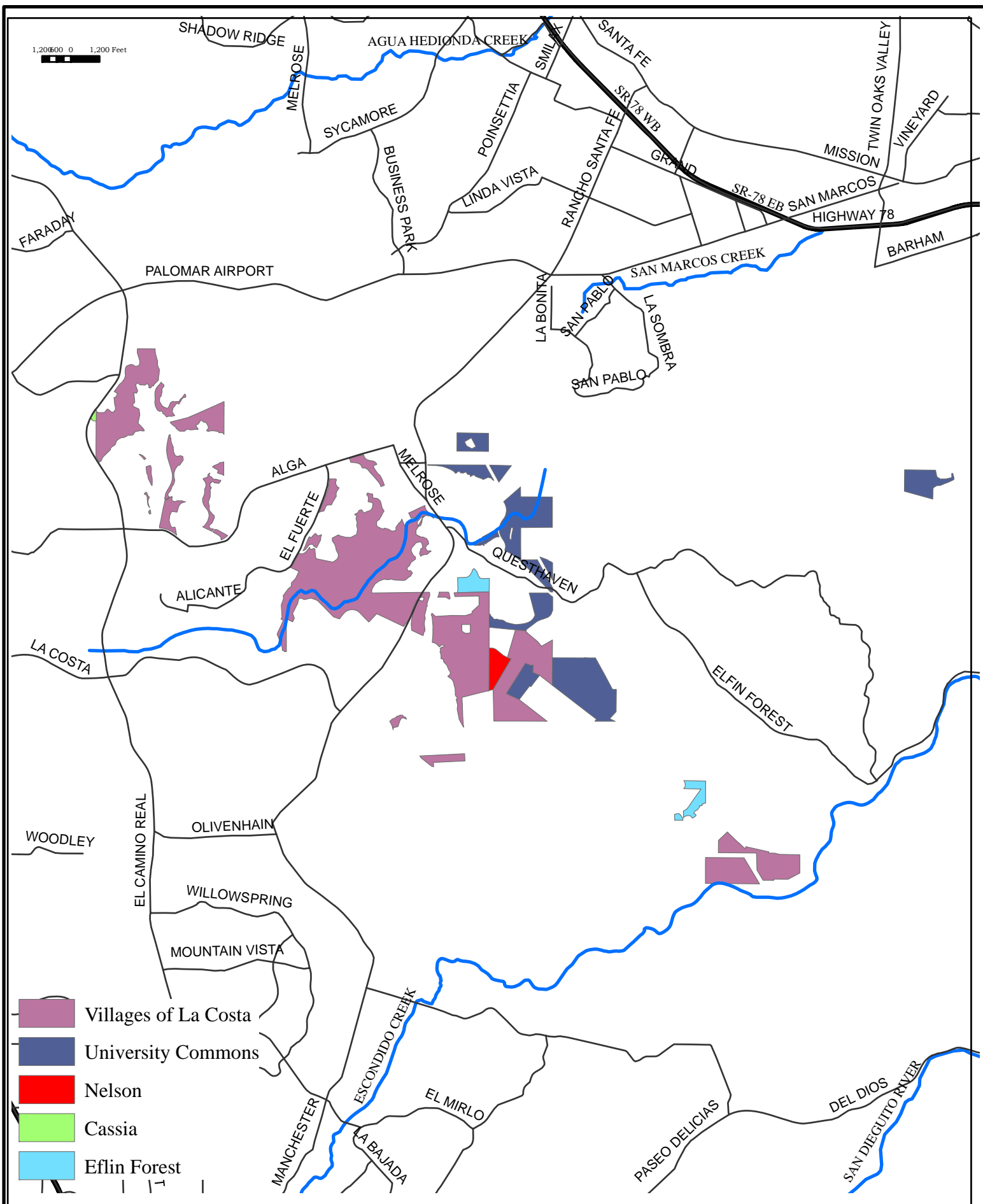


Figure 1  
Preserve Vicinity  
Rancho La Costa Habitat Conservation Area





**Figure 2**  
**Preserve Location**  
 Rancho La Costa Habitat Conservation Area



**Appendix 4**  
**RESEARCH PROPOSAL FOR THE HERBICIDE APPLICATION OF  
FUSILADE TO THREAD-LEAVED BRODIAEA (*Brodiaea filifolia*)**

# RESEARCH PROPOSAL FOR THE HERBICIDE APPLICATION OF FUSILADE TO THREAD-LEAVED BRODIAEA (*Brodiaea filifolia*)

**Submitted to:** Rare Plant Program  
Habitat Conservation Branch  
Department of Fish and Game  
1416 Ninth Street  
Sacramento, Ca 95814

**Submitted by:** Markus Spiegelberg, Jessica Vinje, and Deborah Rogers  
The Center for Natural Lands Management  
215 West Ash Street  
Fallbrook, Ca 92028  
760-731-7790  
[cnlmmarkus@cox.net](mailto:cnlmmarkus@cox.net); [jvinje@cnlm.org](mailto:jvinje@cnlm.org); [debrogers@ucdavis.edu](mailto:debrogers@ucdavis.edu)

**Date:** November 2, 2007

**Re:** Thread-leaved Brodiaea (*Brodiaea filifolia*)

1. **Principle Investigators:** Markus Spiegelberg, Jessica Vinje, Patrick McConnell, and Deborah Roberts
2. **Purpose of the Study:**

The Center for Natural Lands Management (CNLM) manages over 4,000 acres of natural areas in San Diego County in perpetuity. A common threat to our preserves is nonnative plant species. CNLM manages four populations of the state-endangered and federally- threatened thread-leaved brodiaea ( BRFIL) in Carlsbad, California. The dominant vegetation community that these populations occur in, nonnative grassland, is heavily infested with purple-false brome (*Brachypodium distachyon*), as well as other nonnative grass species. Although native grass species are present, their cover has been significantly reduced, most likely by the invasion of these nonnative plant species.

The goal of this project is to find a cost effective and successful approach to managing (limiting cover) nonnative grasses to allow us to enhance these areas and to protect, and potentially enhance, populations of BRFIL. CNLM is proposing a study that uses the monocot and grass specific herbicide, Fusilade, to control nonnative grasses. We are also testing the effect of removing dried nonnative grass thatch as another experimental treatment.

Since BRFIL is a listed species, CNLM is requesting permission to test Fusilade on BRFIL individuals.

In sum, the need to remove nonnative grasses is a necessary management task that will allow us to better protect BRFIL populations and enhance and restore the nonnative grasslands to native grasslands. If Fusilade is found to be effective at killing nonnative grasses and not harming BRFIL, CNLM will have found a cost effective management tool for this species. In addition, we will be able to disseminate this research information to other managers of this species. If Fusilade is found to be harmful to BRFIL, the impact to the species in this area would be extremely minimal.

3. **Location of the Study Site**

In February 2007, CNLM established a pilot study at several of the BRFIL populations located on the Rancho La Costa Habitat Conservation Area (HCA) (Figure 1), specifically located in an area called "The Greens" (Figure 2). The Greens is part of the Rancho La Costa HCA that was set aside as mitigation for the La Costa Villages project under the Multiple Habitat Conservation Plan (MHCP) for North San Diego County. The area and the BRFIL populations are also covered under the City of Carlsbad's Subarea Plan as part of the MHP. California Natural Diversity Database BRFIL element occurrences 33 and 34 are located on the Greens. The pilot study is located in these element occurrences. Only BRFIL occurs at the Greens. No other Brodiaea species occur at the Greens.

#### 4. Methods

##### Management Objective

Increase, or protect a stable mean density of BRFIL and decrease the percent cover of nonnative grasses.

##### Survey Design and Sampling Methodology

CNLM is proposing to apply Fusilade to one of the established subplots (described in Survey Design and Sampling Methodology below) in February 2008. The subplot contains approximately 50 BRFIL.

Three macroplots (Macroplots #1 through #3; Figure 3) were established at the Greens in February 2007. Each macroplot was placed in areas known to support BRFIL. These macroplots were placed across the slope topography (perpendicular to the slopes). A balanced randomized complete block design was used to stratify the treatments (Figure 1). Each macroplot contains sixteen subplots, with four replicates of each treatment. Each subplot occupies an area of 1 meter by 10 meters. These rectangular belt subplots were chosen to better capture the clumped distribution of BRFIL. The treatments would consist of: 1) Fusilade application according to the label 2) Fusilade application plus dethatching of dried litter material 3) Dethatching of dried litter material only and 4) control (no Fusilade application or dethatching).

Monitoring will occur two times per year, once to capture vegetative BRFIL (February data collection) and once to capture flowering BRFIL (May data collection). This would help us to determine the true population of BRFIL in the study areas since less than 10-percent of the true population is estimated to bloom in any given year. It will also allow us to assess the effect of Fusilade on the vegetative portion of BRFIL.

The data collection would span a seven-year time frame to account for weather variation and fluctuation. The first two years (2007 and 2008) would be pilot study years. Data collection and Fusilade application to one subplot would occur in early 2008, as mentioned above. Eight total years of data collection would occur with modifications to the sampling objectives and/or sampling methodology, if necessary, after assessing the results of the first two pilot years.

Within each subplot a direct vegetative count of BRFIL was conducted in February 2007 and a direct flowering count was conducted in May 2007. Species richness was collected by recording all species encountered within each subplot. Percent cover by species was collected in each subplot using a 0.5 by 1 meter quadrat placed at random intervals on the right and left hand sides of a meter tape placed in the middle of each subplot. Three quadrats were read per subplot, and placement of the quadrat on either side of the measuring tape was determined with the flip of a coin. The quadrat contained 36 points, located when metal wires arranged within the quadrat intersected at one decimeter intervals, thus supplying 108 total points per subplot for estimating percent vegetative and ground cover. Vegetative cover was recorded by species. Ground cover was recorded as either bare ground or litter. Bare ground was further characterized as whether or not gopher activity had occurred recently below each pair of intersecting wires. Likewise, litter was characterized as former live vegetation lying directly on the ground as thatch, or rabbit droppings.

Dethatching of dried litter material occurred in October 2007 in order to avoid affecting BRFIL during its vegetative, flowering, or seeding stages.

##### Statistical Methodology

Four attributes are being measured. These include percent cover, direct counts of vegetative and flowering BRFIL, and species richness. Average number of vegetative and flowering BRFIL will be calculated per macroplot, as will average percent cover by category (litter, bare, cover by species), and average species richness by category (native, non-native). From this, repeated measures ANOVA will be performed

annually on these attributes after the first year's analysis is conducted in 2009. Analyses will also be run for site differences.

The potential effect of location has best been accounted for by stratifying the random placement of experimental units throughout each macroplot, and each of the three sites. Site effect will be analyzed despite this, and if no significant effect of site is determined, the variable SITE will be dropped from the analyses.

The null hypothesis is that there will be no difference between controls and experimental manipulation plots. The null hypothesis will be rejected if there is a difference in any of the response variables categorized by treatment. The null hypothesis will be rejected if the resulting probability (p) that the results are due to chance outcome alone (thus likely not due to treatment) is less than 5 percent ( $p < .05$ ). An ad-hoc test will be run in order to identify which treatments differ, and graphics will be produced which carefully illustrate the emergent patterns.

## **5. Impact to State-listed Plants**

The population of BRFIL at the Greens was estimated at 4,610 individuals prior to CNLM taking fee title to the property and commencing management. However, CNLM has established that there are well over 11,000 plants located in these specific study areas at the Greens based on the 2007 survey of BRFIL. CNLM is confident in saying that there are between 15,000 and 20,000 BRFIL that likely occur in areas occupied by BRFIL at the Greens.

CNLM is proposing to apply Fusilade to one of the established subplots (described in Survey Design and Sampling Methodology above) in February 2008. Application of Fusilade must occur during the same time that the BRFIL is emerging and in the vegetative state (which occurs from approximately November/December through March/April). This is necessary because this is when the nonnative grasses are also emerging and are approximately the correct age and height for Fusilade application to be effective. In other words, if the Fusilade is applied to early (when the plants are too small) or too late (after the grasses have flowered and set seed), there will be no effect to the nonnative grasses. Avoidance of BRFIL is not possible for this research proposal. The subplot where Fusilade application would occur contains approximately 50 BRFIL. If Fusilade is determined to be toxic to BRFIL, it would result in the loss of approximately 0.005 percent of the BRFIL that occur in the study macroplots at the Greens, or a total of 50 thread-leaved brodiaea plants.

If Fusilade is found not to be toxic to BRFIL, it would be applied within all our study macroplots in February 2009.

## **6. Schedule of Work**

<b><u>Task</u></b>	<b><u>Timeline</u></b>
collect data	February and May 2007 - 2014
set up pilot experiment	February 2007
apply herbicide	February 2008
dethatch subplots	September 2007 - 2014
Reporting	December 2007 - 2014

## **7. Reports**

An annual report will be submitted to the Department of Fish and Game in December of each year and a final report will be submitted in December of 2014.

## **8. Other Relevant Information**

Currently, Fusilade is thought to not affect bulb or corm monocot species, according to Carl Bell, Regional Advisor-Invasive Plants at the University of California, Davis, Cooperative Extension-County of San Diego. Additionally, Carl Bell performed a similar experiment with Mr. John Eckoff of the California Department of Fish and Game in

the spring of 2007. The results of this study are not known yet, but Mr. Bell feels that the Fusilade likely did not kill the thread-leaved brodiaea. Confirming this hypothesis will not occur until spring 2008. Conversely, Mr. Mike Kelly, of Kelly & Associates, Inc. conducted a similar experiment in 2007 on surrogate bulb and corm species using Fusilade and did note some browning of leaves on the surrogate species (*Muilla maritima*, *Dichelostemma capitatum*, *Allium* spp., etc.); however, the results of his experiment will not be known until early 2008.

## **Appendix 5**

### **CSS Monitoring Plan**

## **The Center for Natural Lands Management-San Diego: Coastal Sage Scrub Monitoring Plan**

**Objective:** Track the changes in structure and composition of the coastal sage scrub (CSS) community.

- a. Use data to evaluate the structure and composition of the CSS vegetation community and its correlation to predictions of vegetation changes based on theories postulated by ecological and threats models.
- b. Use data to evaluate changes or trends in “populations”, presence/absence and/or occupied/unoccupied habitat of sensitive animal species, primarily the coastal California gnatcatcher (*Polioptila californica californica*)(CAGN).
- c. Use data to evaluate changes in plant diversity.
- d. Use data to evaluate changes over time from a baseline vegetation pattern.
- e. Use data to guide vegetation management decisions (i.e. nonnative plant removal, rare species. range increases/introductions).

### **Background of Need:**

The Center for Natural Lands Management (CNLM) manages several thousand acres of CSS in San Diego County. These areas host several threatened, endangered and sensitive plant and wildlife species, provide key locations for wildlife movement and are some of the last remaining stands of CSS in coastal San Diego. These areas were also specifically designated as important areas to conserve as part of regional Habitat Conservation Planning (HCP) conservation efforts.

As a result, the CNLM needs to be able to evaluate recruitment and vigor of this vegetation community over time to guide management decisions and to evaluate changes in plant and animal communities. This monitoring will also provide an opportunity to evaluate theorized predictions of changes in vegetation communities resulting from urbanization, nonnative species invasion, global warming, increased edge, altered fire regime and fragmentation (to name a few).

### **Background of Ecological Model and Threats**

CSS is a fire-adapted vegetation community with fires occurring naturally, but most severely under the extreme Santa Ana heat and winds of late summer and fall and during drought conditions. During these conditions there would generally be a “complete burn” where all above ground vegetation within the fire’s path would be consumed. After such a fire, herbaceous plants (fire followers), which are known to sprout after fires, would dominate the landscape for a few years. Over time (3-5 years) the shrub lands would regain their dominance, and after 5-10 years a mature assemblage of plants and wildlife would again be found on site (Dallman 1998).

The fire frequency in CSS is as frequent as chaparral due to the volatile oils and resins that occur in CSS plants. The plants, such as white sagebrush (*Salvia apiana*), are able to resprout after a fire or produce many seedlings from the dormant seed bank that lies in the soil. Seed germination of some species may also be stimulated by fire (Holland and Keil 1995, Dallman

1998). However, if the fire frequency and intensity are too great, plants in the CSS community, such as black sage (*Salvia mellifera*) and California sagebrush (*Artemisia californica*) are permanently killed and can no longer regenerate, slowly converting the CSS community to a nonnative, annual grassland (Southwest Division, Naval Facilities Engineering Command 1998).

Each CNLM preserve in San Diego has a different fire history and a different predicted fire future. For example, most of the Rancho La Costa (RLC) Habitat Conservation Area (HCA) burned in the Harmony Grove fire in October of 1996, while the Manchester HCA has not burned (except two very small fires) in its entirety since 1917. Prior to 1917 no data are recorded, so it is uncertain as to when the last significant fire event occurred in the Manchester HCA.

Regardless of fire history and the current vegetation characteristics, there are many realized or potential threats to the integrity of the CSS vegetation community (See RLC Habitat Management Plan CSS Ecological Model and Threats Section) that need to be evaluated:

1. What is the effect of the altered fire regime at each HCA?
2. What is the potential effect of global climate change?
3. What are the effects of urban edge?
4. What are the effects of fragmentation and isolation?
5. What are the effects of altered wildlife usage patterns?

These threats questions lead to other questions associated with their effect on ecological processes and patterns:

1. Are the variables investigated representing a threat?
2. At what spatial scale are the variables representing a threat?
3. How do the effects of the threats listed above effect the distribution and abundance of sensitive plant and wildlife species?
4. How do the threats listed above effect the distribution of non-sensitive plants and animals?
5. How do the effects of each threat alter ecological processes?
6. How do the various measured factors interact?

## **Predictions**

Fire. We predict that as a result of fragmentation, complete burns of preserves are now less likely and there will be fewer, smaller fires resulting in a mosaic of CSS with various age structures.

Global Climate Change. We predict that rainfall patterns will change (likely decrease) over the next 100 years resulting in a lengthening of the fire season, frequency of lightening fires, frequency of drought, and areas burned. We predict:

1. Possible regime shifts (altered abundance and recruitment patterns in various native vegetation assemblages)

2. Altered invasion severity of exotic species due to changes from native-adapted variations in weather phenomena
3. Lowered seedling survival of species due to changes from native-adapted variations in weather phenomena
4. Lowered seed and/or clonal production of future generations due to changes from native-adapted variations in weather phenomena
5. Negative interactions between native wildlife and changes resulting from the above mentioned predictions in vegetative cover

Habitat Fragmentation and Urban Edge. We predict that habitat fragmentation will reduce plant diversity and migration and/or genetic exchange between plant populations. This could affect the CSS community by reducing vigor within populations and eventually leading to extinctions of specific plant species.. Habitat fragmentation has resulted in an increase of urban edge on all our preserves. We predict that this will result in increased pressures from nonnative plant species, illegal vegetation clearing, dumping, erosion, and other threats that will change the vegetation structure and composition.

### **Monitoring Methodology**

Approximately fifty plots will be established inside three of our preserves, and the number per preserve allocated by the amount of acreage currently occupied by CSS in each preserve. These plots will be placed in a stratified random manner across our preserves. Stratification will take into account:

1. Size of preserve
2. Slope and aspect
3. Distance from preserve edge/urban edge
4. Presence or absence of CAGN or San Diego horned lizard (*Phrynosoma coronatum blainvillii*)
5. Fire history

### Plot Design and Setup

The plot design will be of a modified Whittaker nested vegetation sampling design as in Stohlgren et al. 1995. The dimensions of the macroplot will be 50 meters long by 20 meters wide. Three smaller nested plots will be placed inside the macroplot. The larger of these three is to be 20 meters long and 5 meters wide, placed in the center of the macroplot, with the long axis corresponding to that of the macroplot. The two other nested plots will be at opposite corners of the macroplot, and will be 5 by 2 meters in length, again with the long axis corresponding to that of the macroplot. The design of the modified Whittaker plot we are using deviates from that described in Stohlgren et al. 1995 by not including the 12 smaller 1- square meter rectangles. The long axis of the modified Whittaker plots will be set to cross the environmental gradient present. Sampling will be carried out for both continuous variables (percent cover by species, perennial species height), non-parametric and semi-continuous variables (count of shrub seedlings, species presence).

### Point Intercept Data

Percent cover by species will be gathered by running a point-intercept transect along one or both long borders of the macroplots. In addition to species cover, height measurements will be collected for all perennial species measured as a “hit” along the transects. The point-intercept transects will be measured at half meter intervals, thus generating 98 “hits” along one or each long side of the macroplot. Living plants will count as a point or “hit,” if a 1.5 millimeter dowel is intersected in the vertical plane by the living tissue of a plant. At each half meter, data pertaining to bare ground, rock, or litter incident with the dowel will also be collected.

### Species Diversity, Recruitment and Mortality

Information gathered inside the plots will include species present in each plot, including the macroplot whole plot. In the two small plots, and in the large central plot, counts of shrub seedlings by species will be documented.

### Rational for a Two-Tiered Approach

The data collected in the macroplot, and smaller sub-plots will be useful in generating species area curves and (more importantly) in documenting species presence or absence, as well as recruitment and mortality over time. The advantages of using a multi-scaled approach to quantifying species richness are identified in Stohlgren et al. 1995. As the years progress, small changes in species presence or seedling recruitment may be observed as disappearances, appearances, increases, or decreases on the micro-scale of sub-plot. The appearance of nonnative species may be quickly identified on the macroplot scale, while the disappearance, or lack of recruitment among native shrubs may be apparent on the smaller plot scale prior to any notice of change on the macroplot scale. Another advantage of using smaller nested plots is that it provides an affordable estimate of shrub recruitment and mortality, since attempting to quantify these measures would be very labor-intensive if carried out on the macroplot scale.

The point-intercept transect measures will provide a method of quantifying change in abundance by species that may provide clues that tie into changes in recruitment or mortality among the sub-plot counts and diversity estimates. For instance, nonnative grasses and/or litter cover changes may be predictive as explanatory variables in a multi-factorial analysis of the response variables mortality or species number decline. Other variables that may be tied into a model explaining the measured pattern may include regional rainfall totals for the season and/or seasonal temperature averages, slope and aspect of plots, fire history, and the presence or absence of animal herbivory.

### **References**

- Dallman, P.R. 1998. Plant life in the world's Mediterranean climates. California Native Plant Society. University of California Press. Berkeley and Los Angeles.
- Holland, V. L., and Keil, D. J., 1995. California vegetation. Kendall/Hunt Publishing Company. Dubuque, IA.

Southwest Division, Naval Facilities Engineering Command. 1998. Camp Pendleton wildland fire management plan update. Marine Corps Base Camp Pendleton. California.

Stohlgren, T. J., Falkner, M. B., and L. D. Schell. 1995. A modified-Whittaker nested vegetation sampling method. *Vegetation*. 117:113-121.